

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN INDICATING INSTRUMENTS

(71) We, VDO ADOLF SCHINDLING AG, of 103 Grafstrasse, Frankfurt/Main, West Germany, a body corporate organized according to the laws of West Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to an indicating instrument having a dial carrying a black coating which reduces light-reflections, and indicating means movable over the dial to indicate the measured value, such as a pointer, and also a light source for illuminating the dial.

Many known indicating instruments of this type have a dial coated with black, matt lacquer on the side facing the viewer, the numerals being applied in white on the lacquer. Such a structure guarantees, on the dial being illuminated by indirect means such as an incandescent lamp arranged rearwardly of the dial, good and almost reflection-free readability of the particular display value. This makes the indicating instrument very suitable in particular for use in motor vehicle display panels. A substantial disadvantage of these indicating instruments consists in that the matt lacquer coating is extremely contact-sensitive and scratch-sensitive and, consequently, costly measures are required for protecting the matt lacquer coating during assembly of the indicating instrument.

Attempts to obviate these disadvantages by applying a black velvet layer have proved unsuccessful to the extent that although a dial thus coated is substantially less sensitive to scratching, nevertheless, it is considerably more costly than a dial carrying a matt lacquer coating. To this must be added the fact that the application of the numerals on the velvet covering involves technical problems in the manufacturing process.

It is an object of the present invention to obviate partially or wholly the above

referred to disadvantages, and so provide an indicating instrument having a dial, the coating of which for diminishing light-reflections is contact and scratch insensitive to a large extent, and which is readily and cheaply applied, and which can be provided without difficulty with the desired numerals and symbols. Additionally, on the dial being illuminated, the numerals are to be recognizable clearly and three-dimensionally to the maximum degree and are to appear on the black background without any glare.

According to the present invention, there is provided an indicating instrument including a dial carrying a black coating reducing light-reflections; indicating means movable over the dial to indicate the measured value; a light source for illuminating the dial; wherein said coating consists of a curable emulsion comprising a plastics lacquer and a plurality of extremely small particles.

The coating preferably comprises a black-dyed plastics lacquer having therein a plurality of plastics particles dyed black and the diameter of which particles is the micron range. By appropriately selecting the plastics lacquer, the coating possesses a high degree of resistance to abrasion and scratching. Moreover, it can readily be processed, for example in a pressurized air spraying process, and it can be provided with numerals and symbols which are white or of some other colour, without difficulty, for example, by screen printing. The degree of reflection of such a coating is extremely low, only a few per cent. The result of this is that, in particular on illuminating the dial, the numerals stand out three-dimensionally from the black background.

The freedom from glare and the three-dimensional image effect can be further enhanced by illuminating the coating with a source of light arranged between the dial and the viewer and shielded relative to the viewer. For the same reason, a colour filter is preferably arranged between the source of light and the coating. The colour filter

preferably consists of a thin polycarbonate foil dyed blue and matted on both sides.

5 The present invention will now be described in greater detail, with reference to the accompanying drawing, wherein the sole figure is a side elevation view, partly in cross section, of one preferred form of indicating instrument.

10 The indicating instrument shown in the drawing is housed with a cylindrical housing 1. The housing 1 is sealed at its end facing the viewer with a window shield 3 retained by a mounting ring (bezel ring) 2. A measuring device (not shown in detail) is located within the housing 1. The measuring device carries a dial 4, in front of which travels a pointer 6 arranged on a spindle 5 connected to the measuring device. The dial 4 carries, on its face facing the viewer, a thin layer 7 of a curable emulsion comprising a plastics lacquer or varnish and a plurality of extremely small particles or spherical shape, commercially obtainable under the trade name NEXTEL 3101. 25 Illumination of the dial 4 is effected by means of a light source arranged between the viewer and the dial 4, and which comprises a light-conducting element 9 and an incandescent lamp (not shown) arranged in the rear housing element, and is shielded relative to the viewer by the mounting ring 2. A filter 10 consisting of a thin polycarbonate foil dyed blue and matted on both sides, is located on an inclined face 8 of the light conducting element 9. 35

dial carrying a black coating reducing light-reflections; indicating means movable over the dial to indicate the measured value; a light source for illuminating the dial; wherein said coating consists of a curable emulsion comprising a plastics lacquer and a plurality of extremely small particles.

2. An indicating instrument according to claim 1, wherein the particles are spherical. 45

3. An indicating instrument according to claim 1 or 2, wherein the coating comprises a black-dyed plastics lacquer having therein a plurality of plastics particles dyed black, the diameter of which particles lies in the micron range. 50

4. An indicating instrument according to any one of the preceding claims, wherein the light source includes a light conducting element, which is arranged between the dial and the viewer, and shielded or screened relative to the viewer. 55

5. An indicating instrument according to claim 4, wherein a colour filter is located on a face of the light conducting element. 60

6. An indicating instrument according to claim 5, wherein the filter consists of a thin polycarbonate foil dyed blue and matted on both sides. 65

7. An indicating instrument constructed substantially as herein described, with reference to and as illustrated in the accompanying drawing.

WHAT WE CLAIM IS:—

1. An indicating instrument including a

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